



Medical isotope production in the UK with ARTHUR

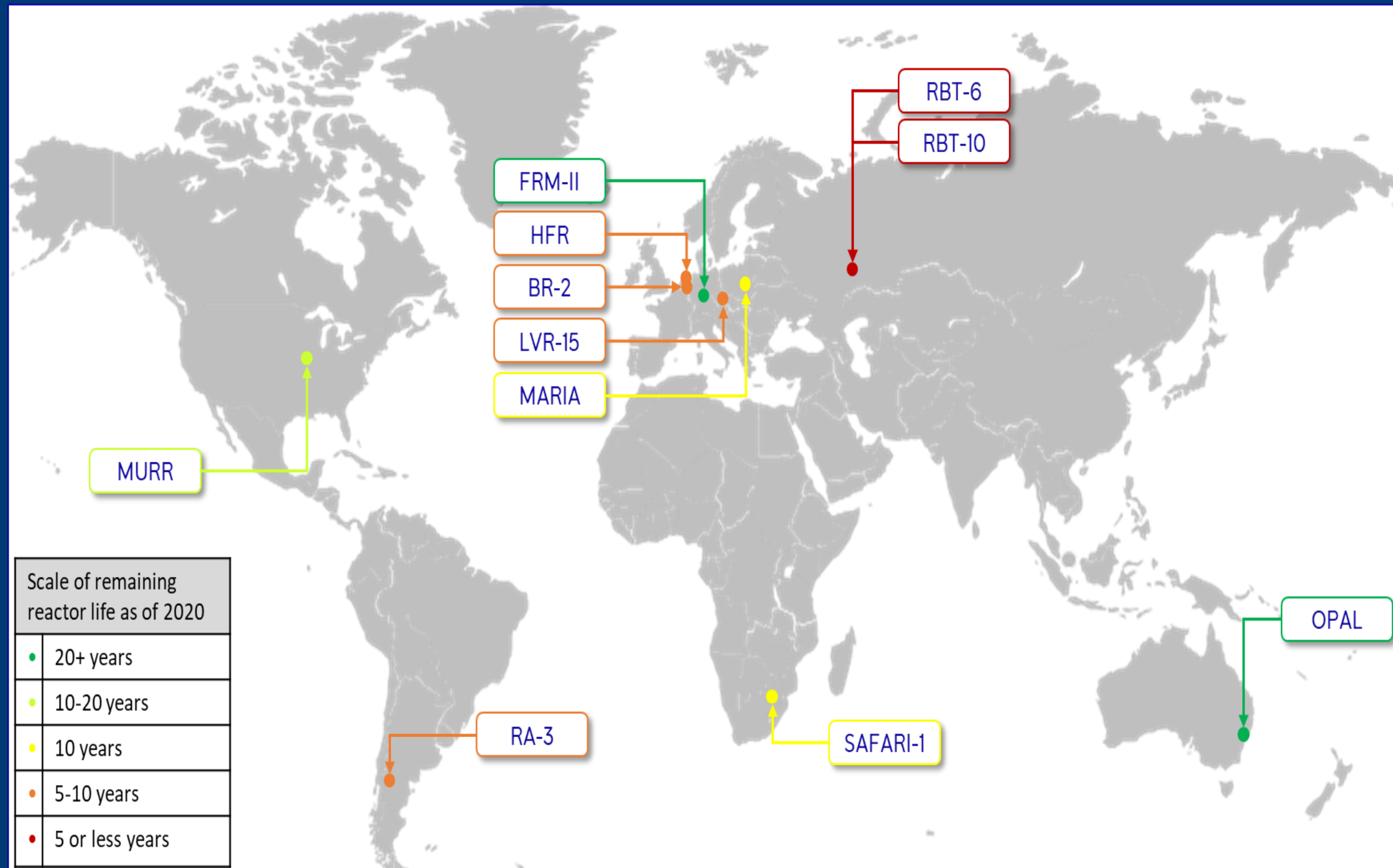
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Nuclear Academics Discussion Meeting, Cambridge, 2021

Global suppliers of reactor-produced medical isotopes

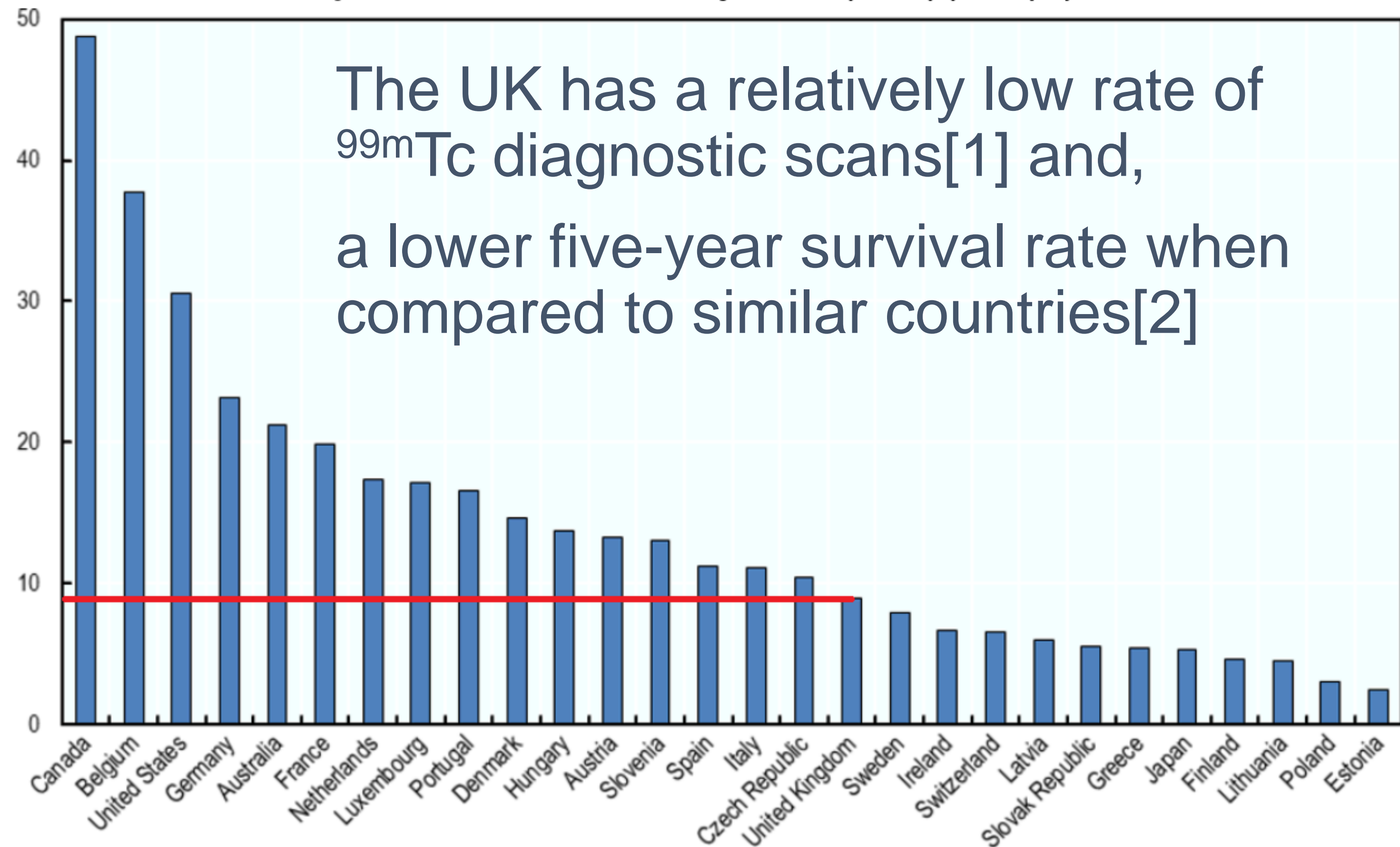


(Rolls-Royce PLC, 2020, Medical Radioisotope and Research Reactor Optioneering Technical Report)

<https://nubu.nu/>

Cancer rates in the UK

Figure 2.1. Number of Tc-99m-based NM diagnostic scans per '000 population per year



Note: Data was collated from various sources and may not be fully accurate or comparable. Refer to Annex B for data accuracy and comparability issues.

Source: Author based on Health Division survey and various public sources. Refer to Annex B for details.

[1] Rolls-Royce PLC, 2020, Medical Radioisotope and Research Reactor Optioneering Technical Report) [2] Arnold, M, et al., 2019,. Lancet Oncol 2019; 20: 1493–505.

Optioneering study

- Welsh government funded, conducted by Rolls-Royce, to ask:
- How do we ensure a sustainable and secure supply of medical radioisotopes for the UK?
 - Which Technology?
 - Where should it be situated?
 - How much is it going to cost?
- What benefits would a terrestrial solution bring?



OPAL (Australia) uses LEU fuel, would meet demand and runs at profit



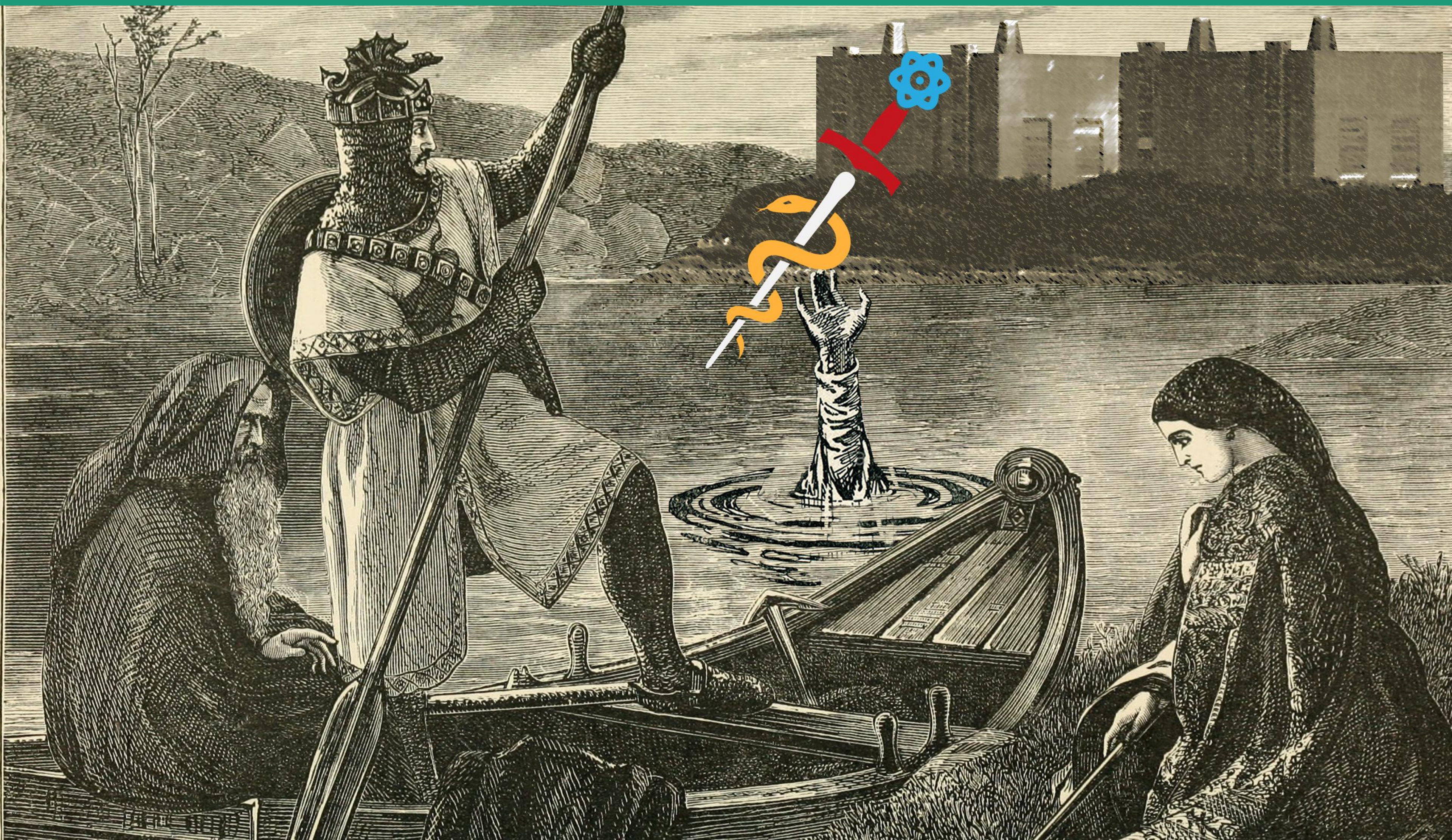
Trawsfynydd an ideal spot (e.g. existing licence, reasonable transit times, not owned by MOD)





Arthur

Advanced Radioisotope Technology for Health Utility Reactor



Aspirations/Additional Benefits

- Opportunities for UK industry -- aspiration for 75% of build and operational materials from the UK.
- Liaison with training providers to upskill workers for construction and operation of the facility.
- Socioeconomic boon to both the region and the UK in terms of skilled jobs
- Potentially form the basis of a future neutron science park
- and more...

Nuclear Medicine at the NFI

Academics

- **Bill Lee FREng (NFI Director)**
- Lee J. Evitts (Lecturer) & Fiona Pearce (PDRA)
- Simon Middleburgh, Michael Rushton & Laurence Williams

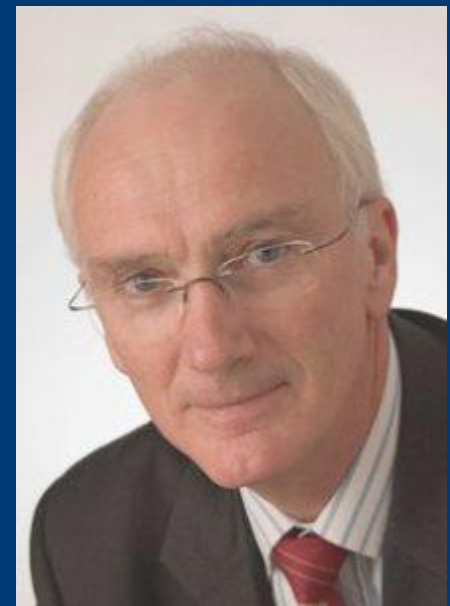
Students

- Conor Buchanen (PhD) 2021 NEF CDT Cohort
- Ffion Davison (2021 summer student), with NNL and QMU to look at isotopes from waste
- KESS2 MRes (w/ Creo Medical) in combining using established microwave technology with delivery of medical nuclides

Honorary members

- Dewi Lewis (CERN)
- Julian MacDonald (Betsi Cadwaladr University Health Board)

Not exhaustive of everyone involved with nuclear medicine and radioisotope production in NFI



Outline of five year vision

1. Support Welsh Government in developing medical radioisotope and research reactor at Trawsfynydd
 - e.g. funded study in the demand and supply of medical isotopes with support from MITHRAS and BNMS
 - Joined Canadian Nuclear Isotope Council (CNIC) to enable knowledge transfer in the production of medical isotopes.
2. Establish local talent in the area
 - e.g. development of MSc program in nuclear medicine; training courses to deliver technicians for medical radioisotope production
 - Aid in the development of a medical school at Bangor University
3. To grow & develop a leading research group
 - Three main research themes (radioisotope production/extraction, diagnosis and therapy)

Wider NFI related research

Wide range of expertise within the NFI enables research in nuclear medicine related areas, examples include

- Materials e.g. doped therapy spheres
- Nuclear policy and regulations e.g. regulations of ARTHUR, transport of radioisotopes not yet produced in UK
- Reactor physics e.g. optimization of radioisotope production in ARTHUR and alternate reactors (e.g. FUSORS)
- Radiation sensors e.g. alternate/cheaper materials for PET detectors or internal radiometry

Next steps and conclusions

- Demand and Supply Study – in progress
- SOBC – Strategic context and outline vision to allow meaningful communication across governments (UK and International) – in progress
- Feasibility Study – What must this programme do?
- Cwmni Egino recently appointed Mike Tynan
- Opportunity to build on existing UK capability to become a world leader in Nuclear Medicine and Radio pharmacy again!
- Opportunities for international collaboration
- High economic value including exports
- And, of course, saving lives.



Thank you